

SEQUENCE LISTING

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<120> Chimeric Ebola Virus Envelopes and Uses Therefor

<130> UPN-02811PCT

<150> US 60/376,480
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<160> 67

<170> PatentIn version 3.2

<210> 1
 <211> 676
 <212> PRT
 <213> Ebola virus

<400> 1

Met Gly Val Thr Gly Ile Leu Gln Leu Pro Arg Asp Arg Phe Lys Arg
 1 5 10 15

Thr Ser Phe Phe Leu Trp Val Ile Ile Leu Phe Gln Arg Thr Phe Ser
 20 25 30

Ile Pro Leu Gly Val Ile His Asn Ser Thr Leu Gln Val Ser Asp Val
 35 40 45

Asp Lys Leu Val Cys Arg Asp Lys Leu Ser Ser Thr Asn Gln Leu Arg
 50 55 60

Ser Val Gly Leu Asn Leu Glu Gly Asn Gly Val Ala Thr Asp Val Pro
 65 70 75 80

Ser Ala Thr Lys Arg Trp Gly Phe Arg Ser Gly Val Pro Pro Lys Val
 85 90 95

Val Asn Tyr Glu Ala Gly Glu Trp Ala Glu Asn Cys Tyr Asn Leu Glu
 100 105 110

Ile Lys Lys Pro Asp Gly Ser Glu Cys Leu Pro Ala Ala Pro Asp Gly
115 120 125

Ile Arg Gly Phe Pro Arg Cys Arg Tyr Val His Lys Val Ser Gly Thr
130 135 140

Gly Pro Cys Ala Gly Asp Phe Ala Phe His Lys Glu Gly Ala Phe Phe
145 150 155 160

Leu Tyr Asp Arg Leu Ala Ser Thr Val Ile Tyr Arg Gly Thr Thr Phe
165 170 175

Ala Glu Gly Val Val Ala Phe Leu Ile Leu Pro Gln Ala Lys Lys Asp
180 185 190

Phe Phe Ser Ser His Pro Leu Arg Glu Pro Val Asn Ala Thr Glu Asp
195 200 205

Pro Ser Ser Gly Tyr Tyr Ser Thr Thr Ile Arg Tyr Gln Ala Thr Gly
210 215 220

Phe Gly Thr Asn Glu Thr Glu Tyr Leu Phe Glu Val Asp Asn Leu Thr
225 230 235 240

Tyr Val Gln Leu Glu Ser Arg Phe Thr Pro Gln Phe Leu Leu Gln Leu
245 250 255

Asn Glu Thr Ile Tyr Thr Ser Gly Lys Arg Ser Asn Thr Thr Gly Lys
260 265 270

Leu Ile Trp Lys Val Asn Pro Glu Ile Asp Thr Thr Ile Gly Glu Trp
275 280 285

Ala Phe Trp Glu Thr Lys Lys Asn Leu Thr Arg Lys Ile Arg Ser Glu
290 295 300

Glu Leu Ser Phe Thr Val Val Ser Asn Gly Ala Lys Asn Ile Ser Gly
305 310 315 320

Gln Ser Pro Ala Arg Thr Ser Ser Asp Pro Gly Thr Asn Thr Thr Thr
325 330 335

Glu Asp His Lys Ile Met Ala Ser Glu Asn Ser Ser Ala Met Val Gln
340 345 350

Val His Ser Gln Gly Arg Glu Ala Ala Val Ser His Leu Thr Thr Leu
 355 360 365

Ala Thr Ile Ser Thr Ser Pro Gln Ser Leu Thr Thr Lys Pro Gly Pro
 370 375 380

Asp Asn Ser Thr His Asn Thr Pro Val Tyr Lys Leu Asp Ile Ser Glu
 385 390 395 400

Ala Thr Gln Val Glu Gln His His Arg Arg Thr Asp Asn Asp Ser Thr
 405 410 415

Ala Ser Asp Thr Pro Ser Ala Thr Thr Ala Ala Gly Pro Pro Lys Ala
 420 425 430

Glu Asn Thr Asn Thr Ser Lys Ser Thr Asp Phe Leu Asp Pro Ala Thr
 435 440 445

Thr Thr Ser Pro Gln Asn His Ser Glu Thr Ala Gly Asn Asn Asn Thr
 450 455 460

His His Gln Asp Thr Gly Glu Glu Ser Ala Ser Ser Gly Lys Leu Gly
 465 470 475 480

Leu Ile Thr Asn Thr Ile Ala Gly Val Ala Gly Leu Ile Thr Gly Gly
 485 490 495

Arg Arg Thr Arg Arg Glu Ala Ile Val Asn Ala Gln Pro Lys Cys Asn
 500 505 510

Pro Asn Leu His Tyr Trp Thr Thr Gln Asp Glu Gly Ala Ala Ile Gly
 515 520 525

Leu Ala Trp Ile Pro Tyr Phe Gly Pro Ala Ala Glu Gly Ile Tyr Ile
 530 535 540

Glu Gly Leu Met His Asn Gln Asp Gly Leu Ile Cys Gly Leu Arg Gln
 545 550 555 560

Leu Ala Asn Glu Thr Thr Gln Ala Leu Gln Leu Phe Leu Arg Ala Thr
 565 570 575

Thr Glu Leu Arg Thr Phe Ser Ile Leu Asn Arg Lys Ala Ile Asp Phe
 580 585 590

Leu Leu Gln Arg Trp Gly Gly Thr Cys His Ile Leu Gly Pro Asp Cys
 595 600 605

Cys Ile Glu Pro His Asp Trp Thr Lys Asn Ile Thr Asp Lys Ile Asp
 610 615 620

Gln Ile Ile His Asp Phe Val Asp Lys Thr Leu Pro Asp Gln Gly Asp
 625 630 635 640

Asn Asp Asn Trp Trp Thr Gly Trp Arg Gln Trp Ile Pro Ala Gly Ile
 645 650 655

Gly Val Thr Gly Val Ile Ile Ala Val Ile Ala Leu Phe Cys Ile Cys
 660 665 670

Lys Phe Val Phe
 675

<210> 2
 <211> 364
 <212> PRT
 <213> Ebola virus

<400> 2

Met Gly Val Thr Gly Ile Leu Gln Leu Pro Arg Asp Arg Phe Lys Arg
 1 5 10 15

Thr Ser Phe Phe Leu Trp Val Ile Ile Leu Phe Gln Arg Thr Phe Ser
 20 25 30

Ile Pro Leu Gly Val Ile His Asn Ser Thr Leu Gln Val Ser Asp Val
 35 40 45

Asp Lys Leu Val Cys Arg Asp Lys Leu Ser Ser Thr Asn Gln Leu Arg
 50 55 60

Ser Val Gly Leu Asn Leu Glu Gly Asn Gly Val Ala Thr Asp Val Pro
 65 70 75 80

Ser Ala Thr Lys Arg Trp Gly Phe Arg Ser Gly Val Pro Pro Lys Val
 85 90 95

Val Asn Tyr Glu Ala Gly Glu Trp Ala Glu Asn Cys Tyr Asn Leu Glu
 100 105 110

Ile Lys Lys Pro Asp Gly Ser Glu Cys Leu Pro Ala Ala Pro Asp Gly
 115 120 125

Ile Arg Gly Phe Pro Arg Cys Arg Tyr Val His Lys Val Ser Gly Thr
 130 135 140

Gly Pro Cys Ala Gly Asp Phe Ala Phe His Lys Glu Gly Ala Phe Phe
 145 150 155 160

Leu Tyr Asp Arg Leu Ala Ser Thr Val Ile Tyr Arg Gly Thr Thr Phe
 165 170 175

Ala Glu Gly Val Val Ala Phe Leu Ile Leu Pro Gln Ala Lys Lys Asp
 180 185 190

Phe Phe Ser Ser His Pro Leu Arg Glu Pro Val Asn Ala Thr Glu Asp
 195 200 205

Pro Ser Ser Gly Tyr Tyr Ser Thr Thr Ile Arg Tyr Gln Ala Thr Gly
 210 215 220

Phe Gly Thr Asn Glu Thr Glu Tyr Leu Phe Glu Val Asp Asn Leu Thr
 225 230 235 240

Tyr Val Gln Leu Glu Ser Arg Phe Thr Pro Gln Phe Leu Leu Gln Leu
 245 250 255

Asn Glu Thr Ile Tyr Thr Ser Gly Lys Arg Ser Asn Thr Thr Gly Lys
 260 265 270

Leu Ile Trp Lys Val Asn Pro Glu Ile Asp Thr Thr Ile Gly Glu Trp
 275 280 285

Ala Phe Trp Glu Thr Lys Lys Thr Ser Leu Glu Lys Phe Ala Val Lys
 290 295 300

Ser Cys Leu Ser Gln Leu Tyr Gln Thr Glu Pro Lys Thr Ser Val Val
 305 310 315 320

Arg Val Arg Arg Glu Leu Leu Pro Thr Gln Gly Pro Thr Gln Gln Leu
 325 330 335

Lys Thr Thr Lys Ser Trp Leu Gln Lys Ile Pro Leu Gln Trp Phe Lys

340

345

350

Cys Thr Val Lys Glu Gly Lys Leu Gln Cys Arg Ile
 355 360

<210> 3
 <211> 511
 <212> PRT
 <213> Vesicular stomatitis virus

<400> 3

Met Lys Cys Leu Leu Tyr Leu Ala Phe Leu Phe Ile Gly Val Asn Cys
 1 5 10 15

Lys Phe Thr Ile Val Phe Pro His Asn Gln Lys Gly Asn Trp Lys Asn
 20 25 30

Val Pro Ser Asn Tyr His Tyr Cys Pro Ser Ser Ser Asp Leu Asn Trp
 35 40 45

His Asn Asp Leu Ile Gly Thr Ala Leu Gln Val Lys Met Pro Lys Ser
 50 55 60

His Lys Ala Ile Gln Ala Asp Gly Trp Met Cys His Ala Ser Lys Trp
 65 70 75 80

Val Thr Thr Cys Asp Phe Arg Trp Tyr Gly Pro Lys Tyr Ile Thr His
 85 90 95

Ser Ile Arg Ser Phe Thr Pro Ser Val Glu Gln Cys Lys Glu Ser Ile
 100 105 110

Glu Gln Thr Lys Gln Gly Thr Trp Leu Asn Pro Gly Phe Pro Pro Gln
 115 120 125

Ser Cys Gly Tyr Ala Thr Val Thr Asp Ala Glu Ala Val Ile Val Gln
 130 135 140

Val Thr Pro His His Val Leu Val Asp Glu Tyr Thr Gly Glu Trp Val
 145 150 155 160

Asp Ser Gln Phe Ile Asn Gly Lys Cys Ser Asn Tyr Ile Cys Pro Thr
 165 170 175

Val His Asn Ser Thr Thr Trp His Ser Asp Tyr Lys Val Lys Gly Leu

180

185

190

Cys Asp Ser Asn Leu Ile Ser Met Asp Ile Thr Phe Phe Ser Glu Asp
 195 200 205

Gly Glu Leu Ser Ser Leu Gly Lys Glu Gly Thr Gly Phe Arg Ser Asn
 210 215 220

Tyr Phe Ala Tyr Glu Thr Gly Gly Lys Ala Cys Lys Met Gln Tyr Cys
 225 230 235 240

Lys His Trp Gly Val Arg Leu Pro Ser Gly Val Trp Phe Glu Met Ala
 245 250 255

Asp Lys Asp Leu Phe Ala Ala Ala Arg Phe Pro Glu Cys Pro Glu Gly
 260 265 270

Ser Ser Ile Ser Ala Pro Ser Gln Thr Ser Val Asp Val Ser Leu Ile
 275 280 285

Gln Asp Val Glu Arg Ile Leu Asp Tyr Ser Leu Cys Gln Glu Thr Trp
 290 295 300

Ser Lys Ile Arg Ala Gly Leu Pro Ile Ser Pro Val Asp Leu Ser Tyr
 305 310 315 320

Leu Ala Pro Lys Asn Pro Gly Thr Gly Pro Ala Phe Thr Ile Ile Asn
 325 330 335

Gly Thr Leu Lys Tyr Phe Glu Thr Arg Tyr Ile Arg Val Asp Ile Ala
 340 345 350

Ala Pro Ile Leu Ser Arg Met Val Gly Met Ile Ser Gly Thr Thr Thr
 355 360 365

Glu Arg Glu Leu Trp Asp Asp Trp Ala Pro Tyr Glu Asp Val Glu Ile
 370 375 380

Gly Pro Asn Gly Val Leu Arg Thr Ser Ser Gly Tyr Lys Phe Pro Leu
 385 390 395 400

Tyr Met Ile Gly His Gly Met Leu Asp Ser Asp Leu His Leu Ser Ser
 405 410 415

Lys Ala Gln Val Phe Glu His Pro His Ile Gln Asp Ala Ala Ser Gln
 420 425 430

Leu Pro Asp Asp Glu Ser Leu Phe Phe Gly Asp Thr Gly Leu Ser Lys
 435 440 445

Asn Pro Ile Glu Leu Val Glu Gly Trp Phe Ser Ser Trp Lys Ser Ser
 450 455 460

Ile Ala Ser Phe Phe Phe Ile Ile Gly Leu Ile Ile Gly Leu Phe Leu
 465 470 475 480

Val Leu Arg Val Gly Ile His Leu Cys Ile Lys Leu Lys His Thr Lys
 485 490 495

Lys Arg Gln Ile Tyr Thr Asp Ile Glu Met Asn Arg Leu Gly Lys
 500 505 510

<210> 4
 <211> 147
 <212> DNA
 <213> Vesicular stomatitis virus

<400> 4
 agctctattg cctctttttt ctttatcata gggttaatca ttggactatt cttggttctc 60
 cgagttggta tccatctttg cattaaatta aagcacacca agaaaagaca gatttataca 120
 gacatagaga tgaaccgact tggaaag 147

<210> 5
 <211> 126
 <212> DNA
 <213> Vesicular stomatitis virus

<400> 5
 ttcgaacatc ctcacattca agacgctgct tcgcaacttc ctgatgatga gagtttattt 60
 tttggtgata ctgggctatc caaaaatcca atcgagcttg tagaagggtg gttcagtagt 120
 tggaaa 126

<210> 6
 <211> 654
 <212> PRT
 <213> Murine leukemia virus

<400> 6

Met Ala Arg Ser Thr Leu Ser Lys Pro Pro Lys Asp Lys Ile Asn Pro
 1 5 10 15

Trp Lys Ser Leu Met Val Met Gly Val Leu Leu Arg Val Gly Met Ala
20 25 30

Glu Ser Pro His Gln Val Phe Asn Val Thr Trp Arg Val Thr Asn Leu
35 40 45

Met Thr Gly Arg Thr Ala Asn Ala Thr Ser Leu Leu Gly Thr Val Gln
50 55 60

Asp Ala Phe Pro Arg Leu Tyr Phe Asp Leu Cys Asp Leu Val Gly Glu
65 70 75 80

Glu Trp Asp Pro Ser Asp Gln Glu Pro Tyr Val Gly Tyr Gly Cys Lys
85 90 95

Tyr Pro Ala Gly Arg Gln Arg Thr Arg Thr Phe Asp Phe Tyr Val Cys
100 105 110

Pro Gly His Thr Val Lys Ser Gly Cys Gly Gly Pro Gly Glu Gly Tyr
115 120 125

Cys Gly Lys Trp Gly Cys Glu Thr Thr Gly Gln Ala Tyr Trp Lys Pro
130 135 140

Thr Ser Ser Trp Asp Leu Ile Ser Leu Lys Arg Gly Asn Thr Pro Trp
145 150 155 160

Asp Thr Gly Cys Ser Lys Val Ala Cys Gly Pro Cys Tyr Asp Leu Ser
165 170 175

Lys Val Ser Asn Ser Phe Gln Gly Ala Thr Arg Gly Gly Arg Cys Asn
180 185 190

Pro Leu Val Leu Glu Phe Thr Asp Ala Gly Lys Lys Ala Asn Trp Asp
195 200 205

Gly Pro Lys Ser Trp Gly Leu Arg Leu Tyr Arg Thr Gly Thr Asp Pro
210 215 220

Ile Thr Met Phe Ser Leu Thr Arg Gln Val Leu Asn Val Gly Pro Arg
225 230 235 240

Val Pro Ile Gly Pro Asn Pro Val Leu Pro Asp Gln Arg Leu Pro Ser

245

250

255

Ser Pro Val Glu Ala Ile Pro Ala Pro Gln Pro Pro Ser Pro Leu Asn
260 265 270

Thr Ser Tyr Pro Pro Ser Thr Ala Ser Thr Pro Ser Thr Ser Pro Thr
275 280 285

Ser Pro Ser Ala Pro Gln Pro Pro Pro Gly Thr Gly Asp Arg Leu Leu
290 295 300

Ala Leu Val Lys Gly Ala Tyr Gln Ala Leu Asn Leu Thr Asn Pro Asp
305 310 315 320

Lys Thr Gln Glu Cys Trp Leu Cys Leu Val Ser Gly Pro Pro Tyr Tyr
325 330 335

Glu Gly Val Ala Val Val Gly Thr Tyr Thr Asn His Ser Thr Ala Pro
340 345 350

Ala Asn Cys Thr Ala Thr Ser Gln His Lys Leu Thr Leu Ser Glu Val
355 360 365

Thr Gly Gln Gly Leu Cys Met Gly Ala Val Pro Lys Thr His Gln Ala
370 375 380

Leu Cys Asn Thr Thr Gln Ser Ala Gly Ser Gly Ser Tyr Tyr Leu Ala
385 390 395 400

Ala Pro Thr Gly Thr Met Trp Ala Cys Ser Thr Gly Leu Thr Pro Cys
405 410 415

Leu Ser Thr Thr Val Leu Asn Leu Thr Thr Asp Tyr Cys Val Leu Val
420 425 430

Glu Leu Trp Pro Arg Val Ile Tyr His Ser Pro Asp Tyr Met Tyr Gly
435 440 445

Gln Leu Glu Gln Arg Thr Lys Tyr Lys Arg Glu Pro Val Ser Leu Thr
450 455 460

Leu Ala Leu Leu Leu Gly Gly Leu Thr Met Gly Gly Ile Ala Ala Gly
465 470 475 480

Ile Gly Thr Gly Thr Thr Ala Leu Ile Lys Thr Gln Gln Phe Glu Gln
 485 490 495

Leu His Ala Ala Ile Gln Thr Asp Leu Asn Glu Val Glu Lys Ser Ile
 500 505 510

Thr Asn Leu Glu Lys Ser Leu Thr Ser Leu Ser Glu Val Val Leu Gln
 515 520 525

Asn Arg Arg Gly Leu Asp Leu Leu Phe Leu Lys Glu Gly Gly Leu Cys
 530 535 540

Ala Ala Leu Lys Glu Glu Cys Cys Phe Tyr Ala Asp His Thr Gly Leu
 545 550 555 560

Val Arg Asp Ser Met Ala Lys Leu Arg Glu Arg Leu Asn Gln Arg Gln
 565 570 575

Lys Leu Phe Glu Ser Gly Gln Gly Trp Phe Glu Gly Leu Phe Asn Arg
 580 585 590

Ser Pro Trp Phe Thr Thr Leu Ile Ser Thr Ile Met Gly Pro Leu Ile
 595 600 605

Val Leu Leu Leu Ile Leu Leu Phe Gly Pro Cys Ile Leu Asn Arg Leu
 610 615 620

Val Gln Phe Val Lys Asp Arg Ile Ser Val Val Gln Ala Leu Val Leu
 625 630 635 640

Thr Gln Gln Tyr His Gln Leu Lys Pro Ile Glu Tyr Glu Pro
 645 650

<210> 7

<211> 96

<212> DNA

<213> Murine leukemia virus

<400> 7

cgattagtcc aatttggttaa agacaggata tcagtgggtcc aggctctagt tttgactcaa 60

caatatcacc agctgaagcc tatagagtac gagcca 96

<210> 8

<211> 856

<212> PRT

<213> Human immunodeficiency virus type 1

<400> 8

Met Arg Val Lys Glu Lys Tyr Gln His Leu Trp Arg Trp Gly Trp Arg
 1 5 10 15

Trp Gly Thr Met Leu Leu Gly Met Leu Met Ile Cys Ser Ala Thr Glu
 20 25 30

Lys Leu Trp Val Thr Val Tyr Tyr Gly Val Pro Val Trp Lys Glu Ala
 35 40 45

Thr Thr Thr Leu Phe Cys Ala Ser Asp Ala Lys Ala Tyr Asp Thr Glu
 50 55 60

Val His Asn Val Trp Ala Thr His Ala Cys Val Pro Thr Asp Pro Asn
 65 70 75 80

Pro Gln Glu Val Val Leu Val Asn Val Thr Glu Asn Phe Asn Met Trp
 85 90 95

Lys Asn Asp Met Val Glu Gln Met His Glu Asp Ile Ile Ser Leu Trp
 100 105 110

Asp Gln Ser Leu Lys Pro Cys Val Lys Leu Thr Pro Leu Cys Val Ser
 115 120 125

Leu Lys Cys Thr Asp Leu Lys Asn Asp Thr Asn Thr Asn Ser Ser Ser
 130 135 140

Gly Arg Met Ile Met Glu Lys Gly Glu Ile Lys Asn Cys Ser Phe Asn
 145 150 155 160

Ile Ser Thr Ser Ile Arg Gly Lys Val Gln Lys Glu Tyr Ala Phe Phe
 165 170 175

Tyr Lys Leu Asp Ile Ile Pro Ile Asp Asn Asp Thr Thr Ser Tyr Lys
 180 185 190

Leu Thr Ser Cys Asn Thr Ser Val Ile Thr Gln Ala Cys Pro Lys Val
 195 200 205

Ser Phe Glu Pro Ile Pro Ile His Tyr Cys Ala Pro Ala Gly Phe Ala
 210 215 220

Ile Leu Lys Cys Asn Asn Lys Thr Phe Asn Gly Thr Gly Pro Cys Thr
 225 230 235 240

Asn Val Ser Thr Val Gln Cys Thr His Gly Ile Arg Pro Val Val Ser
 245 250 255

Thr Gln Leu Leu Leu Asn Gly Ser Leu Ala Glu Glu Glu Val Val Ile
 260 265 270

Arg Ser Val Asn Phe Thr Asp Asn Ala Lys Thr Ile Ile Val Gln Leu
 275 280 285

Asn Thr Ser Val Glu Ile Asn Cys Thr Arg Pro Asn Asn Asn Thr Arg
 290 295 300

Lys Arg Ile Arg Ile Gln Arg Gly Pro Gly Arg Ala Phe Val Thr Ile
 305 310 315 320

Gly Lys Ile Gly Asn Met Arg Gln Ala His Cys Asn Ile Ser Arg Ala
 325 330 335

Lys Trp Asn Asn Thr Leu Lys Gln Ile Ala Ser Lys Leu Arg Glu Gln
 340 345 350

Phe Gly Asn Asn Lys Thr Ile Ile Phe Lys Gln Ser Ser Gly Gly Asp
 355 360 365

Pro Glu Ile Val Thr His Ser Phe Asn Cys Gly Gly Glu Phe Phe Tyr
 370 375 380

Cys Asn Ser Thr Gln Leu Phe Asn Ser Thr Trp Phe Asn Ser Thr Trp
 385 390 395 400

Ser Thr Glu Gly Ser Asn Asn Thr Glu Gly Ser Asp Thr Ile Thr Leu
 405 410 415

Pro Cys Arg Ile Lys Gln Ile Ile Asn Met Trp Gln Lys Val Gly Lys
 420 425 430

Ala Met Tyr Ala Pro Pro Ile Ser Gly Gln Ile Arg Cys Ser Ser Asn
 435 440 445

Ile Thr Gly Leu Leu Leu Thr Arg Asp Gly Gly Asn Ser Asn Asn Glu
 450 455 460

Ser Glu Ile Phe Arg Pro Gly Gly Gly Asp Met Arg Asp Asn Trp Arg
 465 470 475 480

Ser Glu Leu Tyr Lys Tyr Lys Val Val Lys Ile Glu Pro Leu Gly Val
 485 490 495

Ala Pro Thr Lys Ala Lys Arg Arg Val Val Gln Arg Glu Lys Arg Ala
 500 505 510

Val Gly Ile Gly Ala Leu Phe Leu Gly Phe Leu Gly Ala Ala Gly Ser
 515 520 525

Thr Met Gly Ala Ala Ser Met Thr Leu Thr Val Gln Ala Arg Gln Leu
 530 535 540

Leu Ser Gly Ile Val Gln Gln Gln Asn Asn Leu Leu Arg Ala Ile Glu
 545 550 555 560

Ala Gln Gln His Leu Leu Gln Leu Thr Val Trp Gly Ile Lys Gln Leu
 565 570 575

Gln Ala Arg Ile Leu Ala Val Glu Arg Tyr Leu Lys Asp Gln Gln Leu
 580 585 590

Leu Gly Ile Trp Gly Cys Ser Gly Lys Leu Ile Cys Thr Thr Ala Val
 595 600 605

Pro Trp Asn Ala Ser Trp Ser Asn Lys Ser Leu Glu Gln Ile Trp Asn
 610 615 620

His Thr Thr Trp Met Glu Trp Asp Arg Glu Ile Asn Asn Tyr Thr Ser
 625 630 635 640

Leu Ile His Ser Leu Ile Glu Glu Ser Gln Asn Gln Gln Glu Lys Asn
 645 650 655

Glu Gln Glu Leu Leu Glu Leu Asp Lys Trp Ala Ser Leu Trp Asn Trp
 660 665 670

Phe Asn Ile Thr Asn Trp Leu Trp Tyr Ile Lys Leu Phe Ile Met Ile
 675 680 685

Val Gly Gly Leu Val Gly Leu Arg Ile Val Phe Ala Val Leu Ser Ile
 690 695 700

Val Asn Arg Val Arg Gln Gly Tyr Ser Pro Leu Ser Phe Gln Thr His
705 710 715 720

Leu Pro Thr Pro Arg Gly Pro Asp Arg Pro Glu Gly Ile Glu Glu Glu
725 730 735

Gly Gly Glu Arg Asp Arg Asp Arg Ser Ile Arg Leu Val Asn Gly Ser
740 745 750

Leu Ala Leu Ile Trp Asp Asp Leu Arg Ser Leu Cys Leu Phe Ser Tyr
755 760 765

His Arg Leu Arg Asp Leu Leu Leu Ile Val Thr Arg Ile Val Glu Leu
770 775 780

Leu Gly Arg Arg Gly Trp Glu Ala Leu Lys Tyr Trp Trp Asn Leu Leu
785 790 795 800

Gln Tyr Trp Ser Gln Glu Leu Lys Asn Ser Ala Val Ser Leu Leu Asn
805 810 815

Ala Thr Ala Ile Ala Val Ala Glu Gly Thr Asp Arg Val Ile Glu Val
820 825 830

Val Gln Gly Ala Cys Arg Ala Ile Arg His Ile Pro Arg Arg Ile Arg
835 840 845

Gln Gly Leu Glu Arg Ile Leu Leu
850 855

<210> 9
<211> 498
<212> PRT
<213> Lymphocytic choriomeningitis virus

<400> 9

Met Gly Gln Ile Val Thr Met Phe Glu Ala Leu Pro His Ile Ile Asp
1 5 10 15

Glu Val Ile Asn Ile Val Ile Ile Val Leu Ile Val Ile Thr Gly Ile
20 25 30

Lys Ala Val Tyr Asn Phe Ala Thr Cys Gly Ile Phe Ala Leu Ile Ser
35 40 45

Phe Leu Leu Leu Ala Gly Arg Ser Cys Gly Met Tyr Gly Leu Lys Gly
 50 55 60

Pro Asp Ile Tyr Lys Gly Val Tyr Gln Phe Lys Ser Val Glu Phe Asp
 65 70 75 80

Met Ser His Leu Asn Leu Thr Met Pro Asn Ala Cys Ser Ala Asn Asn
 85 90 95

Ser His His Tyr Ile Ser Met Gly Thr Ser Gly Leu Glu Leu Thr Phe
 100 105 110

Thr Asn Asp Ser Ile Ile Ser His Asn Phe Cys Asn Leu Thr Ser Ala
 115 120 125

Phe Asn Lys Lys Thr Phe Asp His Thr Leu Met Ser Ile Val Ser Ser
 130 135 140

Leu His Leu Ser Ile Arg Gly Asn Ser Asn Tyr Lys Ala Val Ser Cys
 145 150 155 160

Asp Phe Asn Asn Gly Ile Thr Ile Gln Tyr Asn Leu Thr Phe Ser Asp
 165 170 175

Ala Gln Ser Ala Gln Ser Gln Cys Arg Thr Phe Arg Gly Arg Val Leu
 180 185 190

Asp Met Phe Arg Thr Ala Phe Gly Gly Lys Tyr Met Arg Ser Gly Trp
 195 200 205

Gly Trp Thr Gly Ser Asp Gly Lys Thr Thr Trp Cys Ser Gln Thr Ser
 210 215 220

Tyr Gln Tyr Leu Ile Ile Gln Asn Arg Thr Trp Glu Asn His Cys Thr
 225 230 235 240

Tyr Ala Gly Pro Phe Gly Met Ser Arg Ile Leu Leu Ser Gln Glu Lys
 245 250 255

Thr Lys Phe Phe Thr Arg Arg Leu Ala Gly Thr Phe Thr Trp Thr Leu
 260 265 270

Ser Asp Ser Ser Gly Val Glu Asn Pro Gly Gly Tyr Cys Leu Thr Lys

275

280

285

Trp Met Ile Leu Ala Ala Glu Leu Lys Cys Phe Gly Asn Thr Ala Val
 290 295 300

Ala Lys Cys Asn Val Asn His Asp Ala Glu Phe Cys Asp Met Leu Arg
 305 310 315 320

Leu Ile Asp Tyr Asn Lys Ala Ala Leu Ser Lys Phe Lys Glu Asp Val
 325 330 335

Glu Ser Ala Leu His Leu Phe Lys Thr Thr Val Asn Ser Leu Ile Ser
 340 345 350

Asp Gln Leu Leu Met Arg Asn His Leu Arg Asp Leu Met Gly Val Pro
 355 360 365

Tyr Cys Asn Tyr Ser Lys Phe Trp Tyr Leu Glu His Ala Lys Thr Gly
 370 375 380

Glu Thr Ser Val Pro Lys Cys Trp Leu Val Thr Asn Gly Ser Tyr Leu
 385 390 395 400

Asn Glu Thr His Phe Ser Asp Gln Ile Glu Gln Glu Ala Asp Asn Met
 405 410 415

Ile Thr Glu Met Leu Arg Lys Asp Tyr Ile Lys Arg Gln Gly Ser Thr
 420 425 430

Pro Leu Ala Leu Met Asp Leu Leu Met Phe Ser Thr Ser Ala Tyr Leu
 435 440 445

Val Ser Ile Phe Leu His Leu Val Lys Ile Pro Thr His Arg His Ile
 450 455 460

Lys Gly Gly Ser Cys Pro Lys Pro His Arg Leu Thr Asn Lys Gly Ile
 465 470 475 480

Cys Ser Cys Gly Ala Phe Lys Val Pro Gly Val Lys Thr Val Trp Lys
 485 490 495

Arg Arg

<210> 10
<211> 180
<212> DNA
<213> Lymphocytic choriomeningitis virus

<400> 10
cttttgatgt tttcaacatc agcatatcta atcagcatct ttctgcatct tgtgaagata 60
ccaacacata gacacataaa gggcggttca tgtccaaagc cacaccgctt gaccaacaag 120
gggatctgta gttgtggtgc attcaagggtg cctggtgtaa aaactatctg gaaaagacgc 180

<210> 11
<211> 31
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 11
aaggatccgc caccatgggc gttacaggaa t 31

<210> 12
<211> 24
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 12
gtcacgacaa actagtttgc cgac 24

<210> 13
<211> 25
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 13
gggaattctt actttccaag tcggt 25

<210> 14
<211> 29
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 14
ggatggagaa gctctattgc ctctttttt 29

<210> 15
<211> 27
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 15
ggatggagaa ttgectcttt tttcttt

27

<210> 16
<211> 27
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 16
ggatggagat ggaaaagctc tattgcc

27

<210> 17
<211> 27
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 17
ggatggagat ccaaaaatcc aatcgag

27

<210> 18
<211> 27
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 18
ggatggagat tttttggtga tactggg

27

<210> 19
<211> 27
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 19

tgtatatgcc gagttggtat ccatctt

27

<210> 20

<211> 27

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 20

tttgtctttc gagttggtat ccatctt

27

<210> 21

<211> 27

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 21

ggatggagac ttttgatggt ttcaaca

27

<210> 22

<211> 28

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 22

gggaattctc agcgtctttt ccagatag

28

<210> 23

<211> 28

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 23

tgtatatgcc gattagtcca atttggtta

28

<210> 24

<211> 29

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 24
gggaattcta tagagcctgg accactgat

29

<210> 25
<211> 29
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 25
gggaattcta tggctcgtac tctatagge

29

<210> 26
<211> 17
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 26
tgggaccgga ctgctgt

17

<210> 27
<211> 27
<212> DNA
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